the channel's maximum time dispersion (the maximum multi-path time delay difference). In the case that the shift interval is smaller than the channel's maximum time dispersion, the shifted version should be modulated by different orthogonal frequencies.

In order to raise the code's duty ratio and transmission data rate simultaneously as much as possible, both of the above methods can be combined, i.e. the basic pulse is composed of pulse compressing codes (including one or more binary or m-ary sequences, or frequency modulated sequences, or frequency and phase jointly modulated sequences, or frequency, phase and time jointly modulated sequences, etc.). At the same time, the codes are time offset and overlapped.

To further increase the number of multiple access codes, the above mentioned basic pulse can also be formed by orthogonal pulse compressing codes (including one or more binary or m-ary sequences, or frequency modulated sequences, or frequency and phase jointly modulated sequences, or frequency, phase and time jointly modulated sequences, etc), or the above mentioned basic pulses can be modulated by different orthogonal frequencies.

Brief Description of the Drawings

Figure 1 illustrates an example of LA-CDMA code groups (with 16 codes) mentioned in the paper.

Figure 2 is an illustration of the non-periodic auto-correlation function mentioned in the paper (for code 1 in figure 1).

Figure 3 is an illustration of the non-periodic auto-correlation function mentioned in the paper (for code 2 in figure 1).

Figure 4 is an illustration of the non-periodic cross-correlation function mentioned in the paper (for code 1 and code 2 in figure 1).

Figure 5 is an illustration of the non-periodic cross-correlation function mentioned in the paper (for code 3 and code 4 in figure 1).

Figure 6 shows the LA-CDMA codes formed by the relative coding pulse compressing method mentioned in the paper.

Figure 7 shows the LA-CDMA codes formed by the absolute coding pulse compressing method mentioned in the paper.

Figure 8 shows the time offsetting and overlapping method to raise the code's duty ratio mentioned in the paper.

Figure 9 shows a diagram of a class of receiver.

Detailed Description

An explanation of the invention with the attached figures is presented below.

Figure 1 is a simple LA-CDMA orthogonal code group including 16 access code words that can be used by 16 users simultaneously. Each code word consists of 16 "±" basic pulses. The period of this code group is 847. The intervals between pulses are respectively: 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 60, 62, 68, 72, 76 and 39. The polarities of the pulses ensure orthogonality between the codes.

Figure 2 and Figure 3 are non-cyclic auto-correlation curves for code 1 and code 2 in Figure 1 respectively. Cross-correlation functions between other pairs of codes have quite similar shapes so that side lobes may equal a value chosen from +1, -1 or 0.

The correlation functions of any other LA-CDMA codes have quite similar shapes, and the only possible difference lies in polarities and positions of side lobes. The features of this code are described as follows:

1) Main lobe value of auto-correlation function equals the number of basic pulses, and also equals the number of orthogonal code words in the code group.
2) There are only three possible values of side lobes in the auto-correlation and cross-correlation function: +1, -1 or 0.
3) A zero correlation window in the auto-correlation and cross-correlation function or around the